



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

---000:0:000---

In re Application of

Shinjirou Sakurai et al.

Group Art Unit: 1774

Application No. 10/524,559

Examiner: BRUCE H. HESS

Filed: February 14, 2005

For: THERMAL RECORDING MATERIAL

Commissioner for Patents  
P.O. BOX 1450  
Alexandria, VA 22313-1450

Sir:

DECLARATION UNDER 37 CFR 1.132

I, Shinjirou SAKURAI, declare and state that:

1. In March, 1968, I was graduated from Turumi industrial High School.

Since April, 1968, I have been an employee of MITSUI Chemicals, INC. (former Toyo Koatsu Industry Co., Ltd.), and till the present time, I have been engaged in research and development work in acrylic-type polymers.

2. I am a co-inventor of the invention described in the specification of the above-identified application.

3. The following Experiments were carried out in order to demonstrate the superiority of the presently claimed invention.

#### [Experiment A]

To 100 g of the copolymer resin emulsion (b)1 obtained in Preparation Example (b)1 was added 7.1 g of a polyolefin copolymer resin emulsion (available from Mitsui Chemicals, Inc.: particle size 1900 nm, Chemipearl W500) having a solid content of 42%, and the reaction mixture was sufficiently stirred to prepare a resin emulsion (a)10. Then, to the prepared resin emulsion were added 3.0 g of an aqueous zinc stearate dispersion (available from Chukyo Yushi Co., Ltd.: F115 fine particle type) having a solid content of 20% and 50 g of water, and the mixture was uniformly mixed and left for one hour to be defoamed. Then, the test liquid taken from the middle layer of the resultant liquid was applied onto the surface of a commercially available heat-sensitive paper for word processor having no surface treatment so as to be 3 g/m<sup>2</sup> in terms of dry weight using a bar coater and dried (after forced drying at 60°C for 30 seconds, curing under 20°C/60% RH atmosphere for 24 hours) to give a thermal recording material.

#### [Comparative Experiment B]

To 100 g of the copolymer resin emulsion (b)1 obtained in Preparation Example (b)1 was added 7.1 g of a polyolefin copolymer resin emulsion (available from Mitsui Chemicals, Inc.: particle size 2500 nm, Chemipearl NRN517-6.7) having a solid content of 42%, and the reaction mixture was

sufficiently stirred to prepare a resin emulsion (a)11. Then, to the prepared resin emulsion were added 3.0 g of an aqueous zinc stearate dispersion (available from Chukyo Yushi. Co., Ltd.: F115 fine particle type) having a solid content of 20% and 50 g of water, and the mixture was uniformly mixed and left for one hour to be defoamed. Then, the test liquid taken from the middle layer of the resultant liquid was applied onto the surface of a commercially available heat-sensitive paper for word processor having no surface treatment so as to be 3 g/m<sup>2</sup> in terms of dry weight using a bar coater and dried (after forced drying at 60°C for 30 seconds, curing under 20°C/60% RH atmosphere for 24 hours) to give a thermal recording material.

[Evaluation]

The running stability, resistance to plasticizers and coating stability of thermal recording materials obtained in Experiment A and Comparative Experiment B as described above were evaluated for according to the methods described in pages 24-26 of the specification, and the results (including those of Example 1 of the specification) are shown in the following Table.

Table

	(a)	Particle size of (c)	(b)/(c) (solid content)	Running stability	Resistance to plasticizers (%)	Coating stability
Example 1	(a)1	400	100/10	○	90	Good
Experiment A	(a)10	1900	100/10	○	80	(c) is slightly separated in (a)
Comparative Experiment B	(a)11	2500	100/10	×	10	(c) is separated as an upper layer in (a)

(a): Resin emulsion

(b): Copolymer resin emulsion

(c): Polyolefin copolymer resin emulsion

4. The polyolefin copolymer resin emulsion (c) is an essential component in order to give an running stability (heat resistance) to the thermal recording material. In addition, it is important that the polyolefin copolymer resin emulsion (c) is dispersed uniformly and independently in the copolymer resin emulsion (b).

In Comparative Experiment B, the polyolefin copolymer resin emulsion (c) (Chemipearl NRN517-6.7) having the particle size of over 2000 nm was mostly separated as an upper layer in the resin emulsion (a) and does not contained in the test liquid taken from the middle layer of the resin emulsion (a). Therefore, the thermal recording material of Comparative Experiment B was inferior in the running stability (heat resistance). In addition, the resistance to plasticizers of the thermal recording material of Comparative Experiment B was deteriorated because the surface of protective layer was damaged, that is, defects in a coating film were occurred.

The undersigned declares further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code

and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Respectfully submitted,

Shinjiro, Sakurai  
Shinjiro SAKURAI

This 3rd day of July, 2007